Beringian Research Notes

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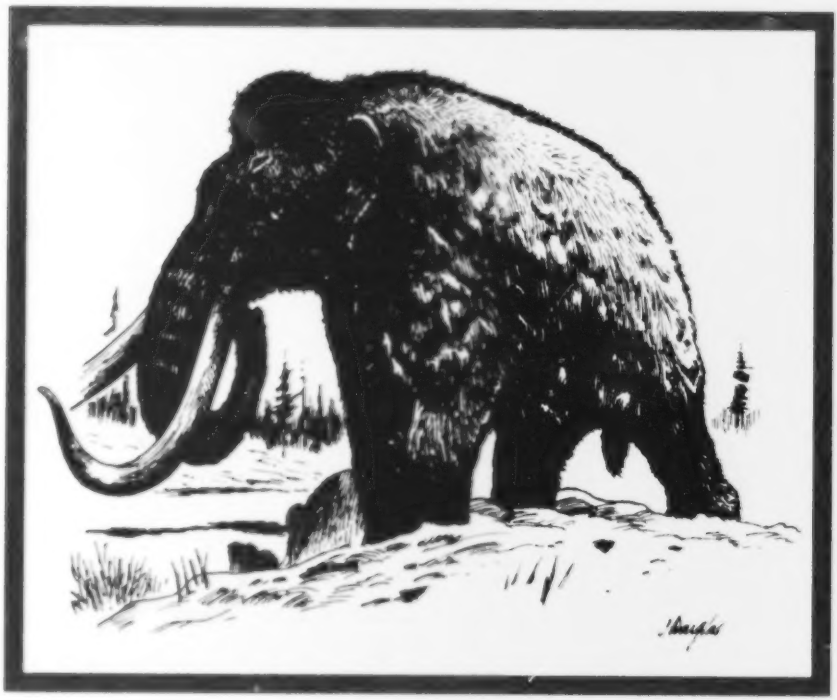

Sketch by C. Douglas

Woolly Mammoth

Woolly mammoths *(Mammuthus primigenius)* are often considered to be symbolic of the last ice age (Quaternary the last 2 million years) because of their large size, broad geographic distribution, relative abundance during the last glaciation and adaptation to cold environments.

A great deal is known about the appearance of these hairy elephants as a result of the discovery of several well-preserved carcasses in frozen ground in Siberia. Other information has come from the study, in European caves, of many detailed carvings, engravings and murals by Stone Age (Paleolithic) artists. Woolly mammoths grew to the size of Asiatic elephants (about 3 m high at the shoulders), and had similar teeth. Their cheek teeth were massive, comprising a

large series of tightly appressed enamel plates filled with softer dentine, all surrounded by cementum, which anchored the teeth in the jaw. As these teeth wore, the enamel ridges stood out and were excellent grinding mills for the relatively tough, dry grasses on which these animals habitually fed. As in living elephants, during a complete lifetime six molar-like teeth developed in each side of each jaw, making 24 teeth in all. Of the six teeth, never more than two were in use at the same time, because there was not enough space in the mouth. Successive teeth grew forward from the back of the jaw replacing earlier, smaller teeth as they wore, moved forward and dropped out.

The coats of woolly mammoths were similar to those of muskoxen, consisting of long, (up to 90 cm), dark guard hairs and fine underwool, underlain by dark-grey skin and an insulating fat layer, which in some cases was up to 90 mm thick. Evidently woolly mammoths, like muskoxen, moulted in summer.

Figure 2: Top view of mandible with lower third molar teeth (note wear surfaces) of the Whitestone mammoth (Mammuthus primigenius) *from Northern Yukon*

Other features characteristic of this species were: a high, peaked head that appears knob-like in many cave pictures; a high hump resulting from the long spines of the neck vertebrae (possibly accentuated by fat deposits and thick hair); a trunk[1] shorter than those of the living Asiatic or African elephants (*Elephas maximus or Loxodonta africana*); and large (up to 4.2 m), elaborately curved tusks. Female tusks are smaller than those of males. The undersides of the tusks often show wear, suggesting that they were used in scraping snow and ice off vegetation or were worn against the ground during feeding. Rarely, while one tusk developed to normal size, the other remained a mere stub perhaps due to damage in youth or to abnormal genetic control. Elephant tusks are, in fact, only transformed second upper incisor teeth.

Woolly mammoths were first recorded in deposits of the second last glaciation (possibly 150,000 years ago) in Eurasia, and were derived from steppe mammoths *(Mammuthus trogontherii)*. As time progressed, several changes occurred in the cheek teeth of woolly mammoths: the series of enamel plates became more numerous and crowded; and the tooth enamel became thinner. Apparently at the same time the tusks became more curved, and body size decreased. Such changes were advantageous in chewing tougher tundra vegetation, and probably the decrease in body size (accompanied by reduction of extremities such as the ears and trunk) and development of a thicker pelt enabled the mammoths to survive under increasingly cold conditions.

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[1] The upper lip at the tip of the trunk formed a broad finger-like feature, while the lower lip, unlike that of living elephants, formed a broad, squarish flap. A Paleolithic engraving of a mammoth at Les Combarelles, France, clearly shows the tip of the trunk, with the finger-like feature above and the broad flap below. It is a convincing example of the remarkable powers of observation of some prehistoric artists.

[2] Land exposed in the relatively shallow Bering Strait region when world-sea level was lowered during periods of continental glaciation, thus joining Siberia and Alaska.

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Remains (especially the durable molar teeth and tusks) of this species have been found in the northern parts of Eurasia and North America. Woolly mammoths probably originated in north-central Eurasia, spreading westward to England and Spain, and eastward via the Bering Isthmus[2] to the tundra-like regions of North America. During the last glaciation, when most of Canada was covered by ice, the species was isolated in refuges north and south of the ice sheets. In the northern area, one of the best preserved specimens consists of much of the front part of the body of a young woolly mammoth from Fairbanks Creek, Alaska, tentatively radiocarbon dated at about 21,000 years old. In life this baby, called "Effie", would have weighed about 100 kg. One of the best Canadian specimens from this area is a skeleton from Whitestone River, Yukon Territory (Figure 2). The mammoth died there about 30,000 years ago, according to a radiocarbon date. In the southern refuge, remains of woolly mammoths have been found in the southern parts of British Columbia, Alberta, Saskatchewan, Manitoba and Ontario, in addition to North Dakota, South Dakota, Minnesota, New York, Virginia and the Atlantic continental shelf off Virginia.

The habitat of the woolly mammoth is clearly indicated by its physical appearance and eating habits. All evidence points to its adaptation to cold climate, and generally in North America its remains are reliable indicators of deposits of the last glaciation (about 90,000 to 10,000 years ago) and tundra-like conditions: tundra, tundra-boreal forest margin, or cold loess-steppe (an environment resulting from massive deposits of fine windblown dust at the edge of ice sheets).

In 1977 the well-preserved carcass of a baby woolly mammoth, subsequently named "Dima", was recovered from permafrost on a tributary of the Kolyma River in northeastern Siberia. It was 115 cm long by 104 cm high and, at death, weighed approximately 100 kg.

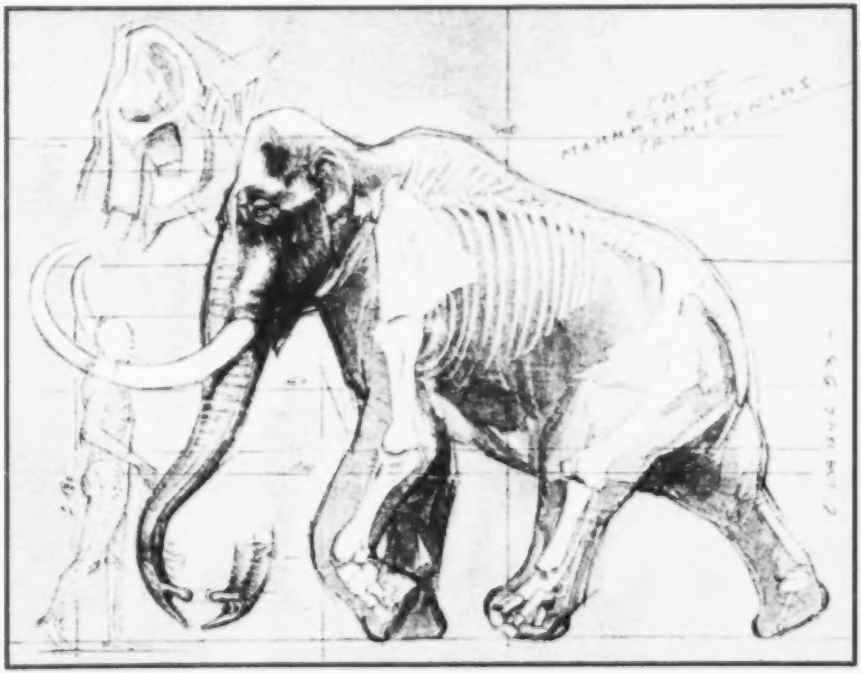

Figure 3: Left side view of woolly mammoth (Mammuthus primigenius). *Anatomical study showing skeletal structure. (Illustration: Benoit Clarys)*

Chestnut-coloured hair was preserved, particularly on the lower parts of the legs. According to radiocarbon dating, the animal died about 40,000 years ago. "Dima's" internal organs do not differ significantly from those of living elephants, but its ears are only one-tenth the size of those of an African elephant of similar age (7 to 8 months).

Scimitar cats (*Homotherium serum*) and American lions (*Panthera leo atrox)* may have preyed on the young, but adults would have been formidable adversaries. Paleolithic hunters apparently killed woolly mammoths in large numbers in Eurasia, particularly in the Ukraine, where the species was of great economic importance. In the Old Crow Basin of the Yukon, mammoth limb bones often show signs of breakage by humans, who probably developed special methods for making and using tools of mammoth bone. In Alaska, a fluted point made by an early hunter was found with bones of a young elephant probably those of a woolly mammoth.

A great variety of Paleolithic structures, tools and carvings have been made from mammoth bones and tusks. Examples are: ice age huts more than 70 were found across the Russian Plain, needles, awls, harpoons, boomerangs, cleavers, shaft wrenches, musical instruments, figurines, dolls, bracelets, beads, pendants and combs.

Woolly mammoths could not cope with the rapidly changing environment and increasing human predation toward the close of the last glaciation, and most became extinct about 11,000 years ago. However in 1993 came the startling announcement that dwarf woolly mammoths radiocarbon dated between 7,000 and 3,700 years ago lived on Wrangel Island. So while the pyramids and Stonehenge were being built in Egypt and England respectively, dwarf mammoths roamed the relic mammoth steppe on this small island off the coast of northwestern Siberia!

C.R. Harington
December, 1995

Woolly Mammoth. Reproduced courtesy of the Canadian Museum of Nature, Ottawa.

Additional Reading

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The Beringian Research Notes series presents vignettes of life in the Yukon during the last Ice Age.

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Yukon Tourism Heritage Branch